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ABSTRACT

In May and June of each year, Soviet students who have completed grades one through ten face a final examination in each of the major subjects which they have studied. The examinations are constructed by the ministries of education in the Soviet republics and are submitted to the individual school district authorities. The type, form, and purpose of the examination are relatively constant each year. The examinations are aimed at verifying the amount of knowledge acquired by the students upon completion of their secondary education, and reflect an effort to have students master a prescribed amount of knowledge from textbooks, other required readings, and practical work. Each pupil selects a card bearing the questions he or she will answer; the student must provide the answers orally, and when appropriate, on the blackboard. Answers are judged by a committee composed of the school director, teachers, and an official from the local district education department. This booklet provides an outline of the course content covered by the 1964 examinations in algebra, geometry, physics, chemistry, history of the USSR and social sciences, and foreign languages (English, German, and French). (Author/JAC)

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# Final Examinations in the Russian Ten-Year School

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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# Final Examinations in the Russian Ten-Year School

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## Introduction

IN PUBLIC DISCUSSIONS AND LITERATURE on the subject of Soviet education, considerable interest has centered on academic achievements and kinds of knowledge which teachers and state authorities demand of Soviet school children. For those persons who are concerned with testing methods and standards of achievement, and for students of comparative education, this document may have special interest.

During part of May and June of each year, Soviet school boys and girls who have completed the regular 10-year school program, that is, those who have completed grades 1 to 10, face an experience which is crucial to their future careers: a final examination in each of the major subjects which they have studied during the years behind them. These examinations have been required of all graduating students everywhere in the USSR since June 1944, when the Soviet Government issued a decree, *On Measures for Improving the Quality of Instruction in the Schools*. This decree called for the present examination system to be applied throughout the federal union. The examinations are made up by the ministries of education in the various Soviet republics, and are submitted by them to the individual district school authorities.

Although the actual number of subjects and the kinds of questions have varied over the years, the type, form, and purpose of the examinations have been relatively constant. The examination pamphlets are published annually a few months before examination time, and bear such titles as "Examination Papers for the Course of the Secondary School . . ." *(Bilety dlia ekzamenov za kurs srednei shkoly na 1963-64 uchebnyi god)*, or "Examination Papers for the School-Leaving Certificate . . ." *(Bilety dlia ekzamenov na attestat zrelosti za kurs srednei shkoly na 1957-58 uchebnyi god)*, and are issued by the state publishing house. The principal aims of these final tests are to verify the amount of knowledge acquired by the 10-year students, or upon completion of their secondary education, and to reveal "their development, independence of judgment, and ability to relate knowledge with life—theory with practice."

The examinations manifestly reflect a principal pedagogical effort to have pupils master a prescribed amount of knowledge from textbooks, other required readings, and practical work. The resulting examination processes require a pattern of questions and problems which respond to the officially set achievement levels but which vary but little from one year's examinations to the next.

A summary comparison of the scope and basic data of the 1958 and 1964 examinations follows by subject:

**Algebra**—21 questions (each with three parts) given in 1958 and also in 1964. This examination aims to test the pupil's knowledge of basic concepts, rules, and theorems in algebra and his ability to understand and apply theorems in solving problems.

**Geometry**—26 questions (each with three parts) in 1958 and 23 questions (each with three parts) in 1964. The aims are identical to those mentioned for algebra, but as they apply to geometry.

**Physics**—32 questions (each with two parts) in 1958 and 25 questions (each with three parts) in 1964. The aims are to test knowledge of basic concepts and laws of electricity, optics, atomic structure, and certain problems of mechanics; the principles of oscillation and heat; ability to explain physical phenomena on the basis of theories and to confirm physical laws by examples from life and technics; and ability to do experiments.

**Chemistry**—31 questions (each with two parts) in 1958, and 25 questions (each with three parts) in 1964. Pupils were tested on their understanding of "concrete ideas" about basic chemical substances and their transformations; ability to formulate chemical equality in reactions, and to make analyses of them; Butlerov's theories of chemical structures; the periodic law of Mendeleev; ability to perform uncomplicated experimental problems; and uses of chemical substances in the economy.

**History of the USSR and Social Sciences**—In 1958 there were 30 questions (each with two parts) and the examination was entitled *History of the USSR*. In 1964 there were 39 questions (each with two parts): the first part on the history of the USSR and the second on social sciences. As in 1958 so in 1964, pupils were tested on their knowledge of the most important events, their significance and consequences; historical leaders such as Marx, Engels, and Lenin; and the leading role of the USSR in history. In addition, in 1964, they were asked about the three component parts of Marxism-Leninism, programs of the Communist Party of the Soviet Union (CPSU) in the spheres of ideology, the "inevitable transition from capitalism to socialism and communism", and other similar questions.

**Foreign Languages**—In 1958, there were three separate examination pamphlets, with 23 questions for the English language, 26 for German, and 25 for French—all having two parts each. For example, on the English language, the question might read:

a. Reading and translation of an unfamiliar text with a dictionary. Answers to questions relating to the text read.

b. Find in the text verbs in the *past perfect*; explain the necessity of using *past perfect* in the given text.

(Questions for the French and German languages followed the same pattern.) However, in 1964, a single pamphlet was used, entitled *Foreign Languages (English, German, and French)*. There were 20 questions, each having two parts, as follows:

a. Reading and translation of an unfamiliar text with dictionary, *or*

Reading of an unfamiliar text without a dictionary and answers to questions relating to text read.

b. Discussion of the XXII Congress of the CPSU.

Each question in 1964 followed the same format—first, the reading and translation of a text with or without a dictionary, and second, a discussion made up of about 8 or 10 questions prepared by the teacher. In both the 1958 and 1964 examinations, pupils were tested on their ability to read aloud selected texts from foreign language books, newspapers, or journals and to translate them; their understanding of foreign speech and ability to respond in the foreign language to questions posed.

The examination procedure is for each pupil, upon call, to go to the front of the room and to select from a basket one card, or ticket, bearing the questions which he will answer. After he has had time to examine the ticket and reflect on the problems, he is asked to provide the answers orally and, when appropriate, on the blackboard. Answers are judged by the examination committee of the school, composed of the school director, teachers, and an official from the local district education department. The grade which the pupil receives may range from *5* (the highest mark) to *1* (the lowest); a grade of *3* is passing, but anything lower is not passing. Pupils who receive *5* in all examinations as well as in their other subjects are awarded gold medals; those who make *5* in the final examinations but have three or less *4*'s in other subjects receive silver medals. Pupils successfully completing the 10-year program, including examinations, receive the certificate of maturity, which is the Soviet secondary school graduation diploma.

## 1963-64 Examinations

The examinations in each subject which follow are from the pamphlet *Bilety dlia vypusknykh ekzamenov za kurs srednei shkoly na 1963-64 uchebnyi god* (Final Examination Questions for the Secondary School for the 1963-64 School Year), published in Moscow in 1964 by the Prosveshchenie Publishing House.

## Algebra

1. a. Combinations and their forms. Ratio of $m$ elements to $n$.
   b. Incomplete equations, their forms and solutions.
   c. Problem or example.
2. a. Permutations. Number of permutations of $m$ elements.
   Combinations. Number of combinations of $m$ elements to $n$.
   b. Solution of incomplete equations $x^2 + px + q = O$.
   c. Problem or example.
3. a. Formula of Newton's binomial (derivation). Common term of separation.
   b. Solution of quadratic equations of the form $ax^2 + bx + c = O$.
   c. Problem or example.
4. a. Properties of combinations: $C_m^n = C_m^{m-n}$. Equality of coefficients of terms equally distant from the beginning and end of Newton's binomial expansion. Sum of binomial coefficients.
   b. Expression of the sum and product of the roots of the quadratic equations through its coefficients.
   c. Problem or example.
5. a. Complex numbers and their classification. Existing and imaginary parts of complex numbers. Geometrical introduction of complex numbers. Condition of two complex numbers being equal. Condition of a complex number equalling zero.
   b. Separation of the trinomial of the second degree into linear factors.
   c. Problem or example.
6. a. Addition and subtraction of complex numbers in algebraic form.
   b. Investigation of the root of a quadratic equation by means of its discriminant and coefficients.
   c. Problem or example.
7. a. Multiplication and division of complex numbers in algebraic form.
   b. Significant function. Properties of the significant function and its graph.
   c. Problem or example.
8. a. Coefficient and amplitude of a complex number. Trigonometric form of complex numbers.
   b. Logarithmic function, its properties and graph.
   c. Problem or example.
9. a. Inequalities. Fundamental properties of inequalities. Addition and subtraction of inequalities.
   b. Logarithm of a product.
   c. Problem or example.

10. a. Equivalent inequalities. Solution of first-degree inequalities with one unknown. Solution of a system of two first-degree inequalities with one unknown.
    b. Logarithm of a quotient.
    c. Problem or example.
11. a. Investigation of first-degree equations with one unknown. Graphic illustration.
    b. Logarithm of a power and a root.
    c. Problem or example.
12. a. Investigation of a system of two linear equations with two unknowns (occurrence of single derivations). Graphic illustration.
    b. Decimals of logarithms and their properties.
    c. Problem or example.
13. a. Investigation of a system of two linear equations with two unknowns (occurrence of infinite numbers of derivations). Graphic illustration.
    b. Logarithm rule. Multiplication, division, increase in square (give an example).
    c. Problem or example.
14. a. Investigation of a system of two linear equations with two unknowns (occurrence of derivation deficiency). Graphic illustration.
    b. Arithmetical progression. Formula of any term of an arithmetical progression.
    c. Problem or example.
15. a. Investigation of the quadratic trinomial (discriminant of the trinomial--positive number).
    b. Formula of the sum of terms of arithmetical progression.
    c. Problem or example.
16. a. Investigation of the quadratic trinomial (discriminant of the trinomial-negative number or equalling zero).
    b. Geometrical progression. Formula of any term of geometrical progression.
    c. Problem or example.
17. a. Solution of second-degree inequalities. Graphic illustration of a quadratic trinomial.
    b. Sum of the terms of geometrical progression.
    c. Problem or example.
18. a. Bezout's theorem. Required and adequate conditions for the divisibility of the integral relative to $x$ polynominal to the binomial $(x-a)$.
    b. Direct proportional function and its graph.
    c. Problem or example.
19. a. Solution of binomial equations of the third degree.
    b. Linear function and its graph.
    c. Problem or example.
20. a. Solution of binomial equations of the sixth degree.
    b. Inverse proportional function and its graph.
    c. Problem or example.
21. a. Solution of binomial equations of the fourth degree. Solution of trinomial equations.
    b. Sum of infinite diminishing geometrical progression.
    c. Problem or example.

## Geometry

1. a. Properties of planes and diagonals of parallelepipeds. Properties of diagonals of rectangular parallelepipeds.
   b. Property of plane angles of a convex polyhedral angle.
   c. Problem or practical exercise.
2. a. Properties of parallel sections in a pyramid and the relationship of the squares between parallel sections of two pyramids of equal altitudes.
   b. Theorem concerning the line of intersection of two planes, of which one cuts a straight line parallel to the other.
   c. Problem or practical exercise.
3. a. Lateral and total surface of an inclined and right prism.
   b. Parallel planes. Sign of parallelism of planes.
   c. Problem or practical exercise.
4. a. Lateral and total surface of a right pyramid.
   b. Determining the length of a circumference. Theorem concerning the constancy of the relationship of the length of the circumference to the diameter.
   c. Problem or practical exercise.
5. a. Lateral and total surface of a right truncated pyramid.
   b. Circumference of a circle. Formula for the circumference of a circle.
   c. Problem or practical exercise.
6. a. Lemma concerning the equality of inclined and straight prisms.
   b. Sign of the perpendicularity of a straight line to a plane.
   c. Problem or practical exercise.
7. a. Volume of a right parallelepiped.
   b. Theorems concerning the perpendicularity and angles with equal and differing projections.
   c. Problem or practical exercise.
8. a. Volume of an inclined parallelepiped.
   b. Theorem concerning the segments of parallel straight lines confined between parallel planes.
   c. Problem or practical exercise.
9. a. Volume of a prism (triangular and polygonal).
   b. Theorem concerning a plane perpendicular to one of the parallel straight lines.
   c. Problem or practical exercise.
10. a. Volume of a pyramid (triangular and polygonal).
    b. Theorem concerning a straight line perpendicular to one of the parallel planes.
    c. Problem or practical exercise.
11. a. Volume of a truncated pyramid.

b. Theorem concerning two planes perpendicular to the same straight line.
c. Problem or practical exercise.

12. a. Right circular cylinder. Lateral and total surface of a cylinder. Division of a cylinder.
b. Property of plane angles of a triangular plane.
c. Problem or practical exercise.

13. a. Right circular cone. Lateral and total surface of a cone. Development of a cone.
b. Perpendicular planes. Sign of the perpendicularity of two planes.
c. Problem or practical exercise.

14. a. Lateral and total surface of a truncated cone.
b. Theorem concerning a straight line perpendicular to one of two mutually perpendicular planes having a common point with another plane; its corollary.
c. Problem or practical exercise.

15. a. Volume of a cylinder.
b. Theorem concerning angles with mutually parallel sides. Intersecting straight lines. Angle of two intersecting straight lines.
c. Problem or practical exercise.

16. a. Volume of a cone.
b. Theorem concerning three perpendiculars. Converse theorem.
c. Problem or practical exercise.

17. a. Volume of a truncated cone.
b. Pythagorean theorem.
c. Problem or practical exercise.

18. a. Sphere (definition). Section of a sphere by a plane. Theorem concerning a plane passing through the center of a sphere and concerning great circle circumferences.
b. Sign of a parallelism of a straight line and plane.
c. Problem or practical exercise.

19. a. Plane touching a sphere (definition). Theorems concerning a plane touching a sphere (direct and converse).
b. Area of a parallellogram and a triangle.
c. Problem or practical exercise.

20. a. Lemma concerning the lateral surface of a cone, truncated cone, and cylinder.
b. Angle between a straight line and a plane. Linear angle of a two-sided angle.
c. Problem or practical exercise.

21. a. Surface of a spherical segment, a belt, and a sphere.
b. First and second signs of equality of a triangle.
c. Problem or practical exercise.

22. a. Lemma concerning the volume of bodies resulting from the rotation of a triangle.
b. Property of the bisector of an internal angle of a triangle.
c. Problem or practical exercise.

23. a. Volume of a spherical sector and of a sphere.
b. Theorem concerning the intersection of two parallel planes by a third.
c. Problem or practical exercise.

## Physics

1. a. The first and second laws of Newton, their appearance in nature and techniques.
   b. Derivation of the formula of a lens. Obtaining images with the aid of a lens (experimentally).
   c. Problem concerned with computing an electrical circuit with parallel or series connections of sources of currents and leads.
2. a. Newton's third law. The law of the conservation of the amount of momentum. Reactive motion and its use in present aviation and in space flights.
   b. Electrical current, strength of light, and illumination. Units of electrical intensity.
   c. Problem regarding the heat action of currents or the conversion of electrical energy into mechanical energy with the calculation of the coefficient of useful action.
3. a. The law of universal gravity. Gravity constant. Field of gravitation; its materiality. First and second cosmic velocity. Success of Soviet science and techniques in the conquest of the cosmos.
   b. Velocity of light; method of its determination.
   c. Laboratory work: Determination of the internal resistance of the source of the current.
4. a. Service, capacity, and energy. Law of conservation and transformation of energy.
   b. Laws of a series connection of conductors.
   c. Problem concerning the laws of illumination.
5. a. Fundamental conditions of molecular-kinetic theory and its experimental basis.
   b. Construction and principles of the action of the transformer and its utilization in practice.
   c. Problem concerning Newton's second law on the movement of bodies in a horizontal direction with calculation of forces of resistance.
6. a. Heat engine. Coefficient of a useful action of the heat engine and methods of its increase. Perspectives of utilization of heat machines in accordance with technical progress in the USSR.
   b. Laws of parallel connections of conductors.
   c. Laboratory work: Determining the focal point of the distance of a lens.
7. a. The electrical field and its materiality. Field intensity. Graphic description of a field.
   b. Stress and velocity in a moving current of liquids and gases. Lifting efficiency on an airplane wing.
   c. Laboratory work: Verification of the Boyle-Mariotte law.
8. a. Work done by the transfer of charge in an electric field. Understanding the potential. Potential differences. Units of potential differences.

b. Experimental evidence of conditions of balance of solids having a spinning axis.

c. Problem concerning the application of the idea about the quanta of light with respect to the photo-effect phenomenon.

9. a. Nature of electrical current in metals. Resistance of metals dependent on the temperature. Demonstration of this dependence on the basis of electronic concepts.

b. Laws concerning the vibration of a pendulum and an experimental illustration. Utilization of a pendulum.

c. Problem concerning the equation of a gaseous state, calculating the composition of gas.

10. a. Electromotive force of a source of current. Ohm's Law for the entire circuit.

b. Derivation of the equation of a gaseous state.

c. Problem concerning the computation of force near the circular motion of solids.

11. a. Nature of an electrical current in a vacuum. Thermoelectric emission and its utilization in electronic appliances.

b. Development of science regarding the composition of substances; perceptivity of the phenomena of nature.

c. Problem concerning the law of the equality of works, calculating the coefficient of the useful action of the mechanism.

12. a. Nature of electrical currents in gases. Sparks and refractions of a discharge. Discharge near a reduced pressure. Practical application of an electrical discharge in gases.

b. Thermal development of solids. Its calculation and utilization in practice.

c. Problem concerning the computation of force near an equally alternating movement of a system of solids fastened by a thread in a horizontal and vertical position and the calculation of the force of resistance.

13. a. Electrolysis. Faraday's laws. Utilization of electrolysis in techniques.

b. Deformation of solids. Aspects of expansible deformation; its utilization in techniques. Hooke's Law.

c. Problem concerning the application of the momentums of force.

14. a. Magnetic field; its materiality. Power lines. Action of the magnetic field on current; utilization of this phenomenon in practice.

b. Phenomenon of wetting and capillarity; their development in nature and utilization in life and in techniques.

c. Laboratory work: Erecting simple radio receivers from preassembled units.

15. a. Phenomenon of an electromagnetic induction; its explanation on the basis of electronic aspects. Magnitude of the electromotive force of induction. Lenz's Law.

b. Liquefaction of gases. Critical temperature. Utilization of liquefied gases in techniques.

c. Problem concerning the law of the conservation of momentum.

16. a. Phenomenon of self-induction. Inductivity. Units of inductivity. Calculating self-induction in techniques.

b. Mechanical impulses. Application of this phenomenon in techniques.

c. Laboratory work: Determining the coefficient of the surface tension of fluids.

17. a. Alternating electrical current. Period, frequency, and phases of alternating currents. Reception of alternating currents.

b. Absolute and relative humidity of the atmosphere. Dew point. Experimental determination of atmospheric moisture.

c. Problem regarding Newton's second law on the equally alternating movements of solids in a vertical direction, with calculation of the resisting force.

18. a. Physical elements in the transmission of electrical energy at a distance. Perspectives of the development of electrification in the USSR.
    b. Uniform movement of solids along a circuit. Centripetal force. Causes for the imponderability of solids of the inside of ship-satellites.
    c. Problem regarding the use of the lens formula, calculating the dimensions of the object and its image.

19. a. Oscillatory circuit. Free and constrained oscillations. Resonance; its use in radiotechniques.
    b. Movement of rays in a microscope and a telescope-refractor.
    c. Problem concerning the application of the law of conservation and transformation of energy by a mechanical process.

20. a. Electromagnetic field; its materiality. Electromagnetic waves and their properties. Physical principles of radiophone transmitting and receiving.
    b. Luminescence. Demonstration of the luminescence on the basis of quantum concepts; utilization of this phenomenon in techniques.
    c. Problem concerning the law of universal gravity.

21. a. Laws regarding the reflection and refraction of light. Complete reflection of light; application of this phenomenon in optical apparatus.
    b. Electrical capacity. Units of capacity. Condensers; their utilization in techniques.
    c. Problem concerning the application of the equation of heat balance, calculating the state of aggregation of the substance.

22. a. Range of electromagnetic waves. Properties of individual parts of the spectrum of electromagnetic waves and their practical utilization. Substance and field—two aspects of matter.
    b. Thermoelectricity; its explanation on the basis of electronic concepts. Utilization of this phenomenon in practice.
    c. Problem concerning the law of conservation and transformation of energy in application to the mechanical and heating processes.

23. a. Spectrums of emission and absorption; explanation of their generation on the basis of learning about the construction of the atom. The spectroscope. Spectral analysis; its utilization in astronomy and techniques.
    b. Power and its measurement. Structure and decomposition of forces.
    c. Problem concerning the law of electrolysis and determining the disbursement of electrical energy.

24. a. Photoelectric effect. Laws of photoeffect; their explanation on the basis of quanta concepts. Photoelements; their application in techniques.
    b. Center of the gravity of the body and its experimental determination. Aspects of balance and arrangement of bodies.
    c. Laboratory work: Determination of the specific resistance of a conductor.

25. a. Nucleus of the atom. Fission of the nucleus of uranium. Chain reaction. Generation of energy through chain reactions. Successes of Soviet science and techniques in mastering nuclear energy.
    b. Iron in a magnetic field. Magnetic induction. Magnetic currents. Utilization of magnetic properties of iron in techniques.
    c. Problem concerning the development of the relation of wave lengths to frequency oscillation.

## Chemistry

1. a. Oxides; their classification and characteristic of chemical properties.
   b. Areas of application of acetylenes. Acetylene properties on which the application is based.
   c. Problem: Compute the release of the product of a reaction in terms of percent of the theoretically possible, if the quantities of the initial substances and the quantity of the obtained product are known.
2. a. Bases; their classification and characteristic of chemical properties in the light of the theory of electrolytic dissociation.
   b. Utilization of polyethylene in the national economy. Properties of polyethylene on which the application is based.
   c. Problem: Obtain the organic acids emanating from a saturated hydrocarbon (write out the reaction equations).
3. a. Acids; their classification and characteristic of chemical properties in the light of the theory of electrolytic dissociation.
   b. Areas regarding the utilization of ethylene. Properties of ethylene on which its use is based.
   c. Experimental problem: Identify, with the aid of characteristic reactions, each of two furnished organic substances.
4. a. Salts; their classification and characteristic of chemical properties in the light of the theory of electrolytic dissociation.
   b. Areas regarding the utilization of methane. Properties of methane on which its use is based.
   c. Problem: Estimate the gas content required for a reaction with a given content of another gas.
5. a. Comparative characteristic of alkali metals on the basis of their location in the periodic system of elements and structure of atoms.
   b. Areas of utilization of ethyl alcohol in the national economy. Properties of ethyl alcohol on which its utilization is based.
   c. Experiment: Make reactions characteristic for a given organic substance.
6. a. Comparative characteristic of halogens on the basis of their location in the periodic system of elements and structure of atoms.
   b. Areas of utilization of acetic acid in the national economy. Properties of acetic acid on which its utilization is based.
   c. Problem: Estimate the weight of the product of a reaction, if certain amounts of initial products in the form of solutions of certain percentage concentration have been used for it.
7. a. Basic scientific principles of chemical productions by samples of the production of sulphuric acids. Chemical reactions embedded in the base of the production of sulphuric acid.

b. Areas of the utilization of formaldehyde. Properties of formaldehyde on which their utilization is based.

c. Problem: Estimate what quantity of an assigned substance is obtained in a reaction, if the quantity of each of the initial substances is known and one of them is taken in excess.

8. a. The periodic law and the periodic system of elements in the light of the theory of the structure of the atom.

b. Areas of the application of benzene. The properties of benzene on which their application is based.

c. Problem: Estimate the content of gas obtained from a given quantity of the initial substance containing an indicated quantity of ingredients.

9. a. Basic scientific principles of chemical production by samples of the production of ammonia.

b. Area of the application of phenol. Properties of phenol on which its application is based.

c. Experimental problem: Obtain a given substance of an exchange reaction and separate it from the mixture. Compute on the basis of the reaction equation the quantity of each of the initial substances which is required for obtaining the indicated quantity of the product.

10. a. Characteristic of chemical properties of metals in the light of learning about the structure of the atom.

b. Significance of mineral fertilizers in the national economy. The more significant phosphorous and nitrogen fertilizers. Composition, properties, and chemical reactions recumbent in the base of their production.

c. Experimental problem: Determine, with the help of characteristic reactions each of two furnished organic substances.

11. a. Production of pig iron. Chemical reactions lying at the base of the blast-furnace process.

b. Application of starch in the national economy. Properties of starch on which its application is based.

c. Experiment: Make reactions verifying the qualitative composition of a given inorganic substance.

12. a. Chemical reactions lying at the base of the cast iron for steel. Extracting converted and open-hearth steel.

b. Areas of application of cellulose. Properties of cellulose on which its application is based.

c. Experiment: Make reactions characterizing the chemical properties of alkalis.

13. a. Corrosion of metals as an oxidizing-reduction process. Aspects of corrosion. Measures of preventing corrosion.

b. Application of glucose. Properties of glucose on which its application is based.

c. Experimental problem: Obtain a given substance of an exchange reaction and separate it from the mixture; compute according to the equation of a reaction the quantity of each of the initial substances required to obtain the indicated quantity of the product.

14. a. Theory of the structure of organic compounds of A. M. Butlerov (give examples); its dialectical-materialistic significance for understanding nature, development of science and industry.

b. Areas of application of compounds of calcium in the national economy. Properties of the compounds of calcium on which their application is based.

c. Experiment: Extract and collect gaseous substances; show by experiment the presence of a given gas.

15. a. Properties of saturated hydrocarbons in the light of Butlerov's theory of chemical structure.

b. Areas of application of aluminum and its alloys. Properties of aluminum and its alloys on which their application is based.

c. Experimental problem: Make a reaction confirming the qualitative composition of a furnished inorganic substance and on the basis of its formula find the percentage content within it of one of the elements.

16. a. Properties of unsaturated hydrocarbons in the light of Butlerov's theory of chemical structure.

b. Causes of hardness of natural water and methods of eliminating them.

c. Problem: Determine the quantity of an initial substance, if the practical product output is known and if it shows the percentage composition from the theoretical potential.

17. a. Benzene as a representative of a class of aromatic hydrocarbons; its structure and properties.

b. Areas of application of chlorine. Properties of chlorine on which its application is based.

c. Experiment: Extract and collect a gaseous substance; show by experiment the presence of a given gas.

18. a. Petroleum as a natural source of hydrocarbons; its composition, properties, and methods of industrial processing.

b. Application of carbon dioxide. Properties of carbon dioxide on which its application is based.

c. Problem: Compute the weight of the product of reaction if determined quantities of initial substances in the form of solutions of a definite percentage concentration are used for it.

19. a. Ethyl alcohol as representative of saturated monatomic alcohols; structure of its molecule; its physical and chemical properties.

b. Application of alkali hydroxides in the national economy. Properties of alkalis on which their application in the national economy is based.

c. Problem: Compute what quantity of a given substance is obtained in a reaction, if the quantity of each of the initial substances is known and one of them is taken in excess.

20. a. Significance of D. I. Mendeleev's periodic law and periodic system of elements for the dialectical-materialistic understanding of nature, development of science and industry.

b. Acetic acid as representative of carboxylic acids; structure of its molecule and its physical and chemical properties.

c. Experiment: Obtain the amphoteric hydroxide and make reactions characterizing its chemical properties.

21. a. Fats; their composition and physical and chemical properties.

b. Areas of application of sulphuric acid in the national economy. Properties of sulphuric acid on which their application is based.

c. Experiment: Obtain and make up a gaseous substance; prove by experiment the presence of a given gas.

22. a. Starch as a representative of natural high-molecular weight compounds. Physical and chemical properties of starch.

b. Practical application of sulphuric acid salts. Properties of these compounds on which their application is based.

c. Experiment: Make reactions characterizing the chemical properties of acids.

23. a. General characteristic of plastics. Polyethylene and phenol formaldehyde plastics; their production, structure, and properties.

b. Application of soda in the national economy and in the way of life. Properties of soda on which its application is based.

c. Problem: Compute the weight of the product of reaction, if a certain quantity of the initial substance containing a specified quantity of impurities is used for it.

24. a. Classification of fibers. Caprone as a representative of synthetic fibers; structure of its molecule and its properties and application.

b. Areas of application of sodium chloride. Properties of sodium chloride on which its application is based.

c. Experimental problem: Determine, with the aid of characteristic reactions, each substance from three furnished inorganic substances.

25. a. December 1963 Plenum of the Central Committee of the CPSU regarding the development of the chemical industry and the chemicalization of the national economy.

b. General characteristic of rubber. Butadiene rubber as representative of synthetic rubbers; structure of its molecule; its properties and production.

c. Experimental problem: Determine, with the aid of characteristic reactions, each substance from three furnished inorganic substances.

## History of the USSR and Social Sciences

1. a. Transition of Russia to imperialism. Characteristics of imperialism in Russia.
   b. Conversion of the state dictatorship of the proletariat into a common state. Program of the CPSU regarding the further development of socialist democracy and regarding the transformation of the socialist state into a communist self-government.
2. a. Struggle of V. I. Lenin for the creation of the Revolutionary Marxist Party in Russia from 1900 to 1903. The Second Congress of the Russian Social Democratic Labor Party (RSDLP)
   b. Matter and forms of its existence.
3. a. Historical prerequisites and problems of the First Russian Revolution. The beginning of the revolution in Russia.
   b. K. Marx, F. Engels, and V. I. Lenin—great leaders and teachers of the world proletariat. Three component parts of Marxism-Leninism.
4. a. The Third Congress of the RSDLP regarding the character, motive forces, and perspectives of the first Russian revolution. Fundamental revolutionary events in the summer and autumn of 1905; their significance. Defeat of Czarism in the Russo-Japanese War.
   b. Program of the CPSU and the June 1963 Plenum of the Central Committee of the CPSU regarding the tasks in the spheres of ideology and the upbringing of the new man; principles of the moral code of the builder of communism.
5. a. The December armed uprising of 1905; its lessons. The Third of June State Revolution. Causes of the defeat and historical significance of the 1905-1907 revolution.
   b. Marxism-Leninism on the development and change of social-economic formations. Historical inevitable transition from capitalism to socialism and communism.
6. a. Intensification of class contradictions in Russia during the years of reaction. Struggle of the Bolsheviks for the consolidation of the Party from 1907 to 1910.
   b. The working masses—the decisive force of social development. The role of personality in history.
7. a. Prerequisites of the new revolutionary upsurge. Bolsheviks at the head of the revolutionary struggle of the masses during 1910 to 1914.
   b. Policy of economy and nonfinancing by the State in the socialist national economy.
8. a. Causes and characteristics of the first world war. Role of the Eastern Front in the war. Struggle of the Bolsheviks against the social chauvinists for the conversion of the imperialist war into a civil war.
   b. Socialist law in the USSR.
9. a. Causes of the February bourgeois-democratic revolution in Russia. Overthrow of Czarism. Dual power. Historical significance of the February revolution.
   b. Essence of capitalist exploitation.

10. a. Arrival of V. I. Lenin in Petrograd. V. I. Lenin's April theses and their historical significance.

    b. Means of transition to communist labor and distribution.

11. a. The July 1917 events in Petrograd—the turning point in the development of the revolution. The VI Party Congress and its historical significance. Growth of the revolutionary crisis in the country (defeat of Kornilov; Bolshevitizing of the Soviets).

    b. Economic basis of socialism; forms of socialist property in the USSR.

12. a. Historical prerequisites of the Great October Socialist Revolution. Armed uprising in Petrograd. The II Congress of the Soviets and its historical significance.

    b. Methods of creating a classless communist society.

13. a. The triumphal spread of Soviet rule. *Declaration of Rights of the Peoples of Russia.* Liberation by the Soviet power in 1917 of subjugated peoples.

    b. Peaceful coexistence of socialist and capitalist states—the objective necessity of the development of society and a specific form of the class struggle between socialism and capitalism.

14. a. Organization of the Soviet state. Historical significance of the establishment of the proletariat dictatorship in Russia. Collapse of the old state apparatus and the creation of the Soviet state apparatus. *Declaration of Workers' Rights and the Exploitation of the People.*

    b. CPSU—the Party of all Soviet peoples; principles of the creation of the Party.

15. a. The Bolshevik Party headed by Lenin—organizer of the victory of the Socialist revolution in Russia. The universal historical significance of the Great October Socialist Revolution.

    b. Laws of dialectical materialism.

16. a. Revolutionary emergence of Soviet Russia from the war. Causes of the Civil War and intervention against the Soviet land. The role of international imperialism in the organization of the intervention and the civil war. The Soviet Republic in the ring of (military) fronts in 1918.

    b. World communist movement—the most influential political force of our times.

17. a. The defeat of the White Guard armies of Kolchak and Denikin. Mass heroism of the Soviet people in the struggle against the interventionists and the White Guards.

    b. The working class—the principal motive power of the revolutionary reorganization of society.

18. a. Defeat of the armies of Poland's and Wrangel's landowning bourgeois. Causes and historical significance of the victory of the Soviet Republic in the civil war.

    b. Goal of socialist production. Systematic development of socialist national economy; its advantages over capitalist economy.

19. a. Policy of military communism. Economic and cultural structure during the civil war years. The first communist "subbotniks" [1] and their historical significance.

    b. Imperialism—the higher and last stages of capitalism—the eve of the socialist revolution. The more important features and basic lines of the third stage of the general crisis of capitalism.

[1] Labor freely given to the State on days off or overtime.

20. a. Lenin's plan for the electrification of Russia and the struggle of the Soviet peoples for its realization. Program of the CPSU for the complete electrification of the USSR.

    b. The downfall of the colonial system of imperialism.

21. a. International and internal situation of the Soviet Republic after the civil war. X Party Congress; resolution regarding the union of the Party. Transition towards a new economic policy. Essence and significance of the New Economic Policy [NEP].

    b. Successes of the world system of socialism in peaceful competition with capitalism.

22. a. Formation of the USSR. Universal-historical significance of the creation of the first multinational socialist state in the world.

    b. Possibility of knowing the world; social-historical practice—the basis of knowledge.

23. a. Strengthening the international situation of the USSR in 1925. The XIV Party Congress. Course for socialist industrialization. The feats of labor of the Soviet people. Basic results of the industrialization of the country during the prewar 5-year plans (1928-1941).

    b. Fundamental rights and responsibilities of the USSR citizens; their unity and guarantees.

24. a. The XV Party Congress. Defeat of the Trotskyite-Zinov'evite bloc. Course for the collectivization of the agricultural economy. Struggle against right-wing deviations. Transition of the Soviet village towards a large-scale socialist economy—a great revolution in economic attitudes in all the tenors of life of the peasantry.

    b. Social organization of the workers in the USSR.

25. a. Cultural revolution—the component part of Lenin's plan for the building of socialism; its realization in the USSR.

    b. World system of socialism—new type of economic and political attitudes between states.

26. a. The 1936 Constitution of the USSR and its historical significance.

    b. Significance of the growth of the labor industry for the victory of the new social structure.

27. a. Struggle of the USSR for the peace and safety of the people during 1926-40. Expansion of family brotherhood of the peoples of the USSR. Reinforcement of the defense potential of the country.

    b. The essence of the exploiter state; its historical types and forms.

28. a. The beginning of the Great Patriotic War. Mobilization of the forces of the Soviet people in the fight with the enemy. Defeat of the German-Fascist armies in Moscow.

    b. Creation of the material-technical bases of communism—the principal economic task of the Party and the Soviet people.

29. a. Radical turn at the start of the Great Patriotic War and its international significance.

    b. Program of the CPSU regarding the characteristic features of the Communist society. Principal problems and basic stages of Communist structure in the USSR.

30. a. Offensive of the Soviet Army in 1944-45 and its decisive role in the liberation of foreign countries from Hitlerite aggressors. Final military defeat of Hitler's Germany in 1945. Methods of a just solution of the German problem.

    b. Lenin's plan for the building of socialism and its universal historical significance.

31. a. Surrender of imperialist Japan in 1945. International significance of the victory of the Soviet Army in the Far East in the Second World War.

    b. Socialism and communism—two phases of a single social-economic formation.

32. a. The heroic struggle of the Soviet partisans during the years of the Great Patriotic War: selfless work of the Soviet people on the home front. Causes and universal-historical significance of the victory of the Soviet Union in the Second World War.

    b. Increasing role and the significance of the Communist Party as the guiding force of the Soviet society during the period of the large-scale building of communism.

33. a. Results of the post-war reconstruction of the national economy. Struggle of the Soviet people for the powerful upsurge of the national economy during 1953-58.

    b. Organs of State power and administration in the USSR. Democracy of the Soviet electoral system.

34. a. XX Congress of the CPSU and its historical significance. Censure by the XX Congress of Stalin's personality cult and measures for liquidation of its injurious effects.

    b. Sovereignty of the USSR and the Union Republics. Program of the CPSU regarding the tasks in the area of national relations.

35. a. Principal tasks of the 7-year plan adopted by the XXI Congress of the CPSU. Struggle of the Soviet people under the direction of the Communist Party for the scheduled fulfillment of the 7-year plan. Movement for communist labor and its significance.

    b. Class composition of the socialist society.

36. a. Universal-historical significance of the XXII Congress of the CPSU and the new Party program. Struggle of the Soviet people under the direction of the Communist Party for the realization of the program for the building of communism.

    b. Competition and anarchy of industry under capitalism.

37. a. Historical significance of the December (1963) Plenum of the CC of the CPSU.

    b. Class struggle—the moving force of the history of an exploiting society.

38. a. The USSR in the struggle for the preservation and the strengthening of peace and for the universal and complete disarmament after the Second World War. The program of the CPSU regarding the tasks in the area of international relations.

    b. Labor and distribution under socialism.

39. a. The subsequent development of science and culture in the USSR after the Great Patriotic War. The universal-historical achievements of Soviet science and techniques in conquering cosmic space. Program of the CPSU in the field of education, science, and culture.

    b. Collective agreement: safeguarding labor in the USSR. Fundamental differences between socialist and capitalist labor relations.

## Foreign Languages
### (English, German, and French)

1. a. Reading and translation of an unfamiliar text with dictionary.
   b. Conversation on the theme *Our Native Land*.
2. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
   b. Discussion of the XXII Congress of the CPSU.
3. a. Reading and translation of an unfamiliar text with dictionary.
   b. Discussion of the Soviet cosmonauts.
4. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
   b. Discussion of the country of the language studied.
5. a. Reading and translation of an unfamiliar text with dictionary.
   b. Conversation on the theme *Our School*.
6. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
   b. Conversation on the theme *My Working Day*.
7. a. Reading and translation of an unfamiliar text with dictionary.
   b. Conversation on the theme *My Free Day*.
8. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
   b. Conversation on the theme *Our Home and Apartment*.
9. a. Reading and translation of an unfamiliar text with dictionary.
   b. Discussion on a visit to the theater (movie, museum, concert).
10. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
    b. Discussion on the theme *Sports*.
11. a. Reading and translation of an unfamiliar text with dictionary.
    b. Discussion regarding vacations (winter, summer) or on the theme *Travels*.
12. a. Reading of an unfamiliar text without dictionary and answers to questions relating to the text read.
    b. Discussion on the theme *Our work in industry (on the collective farm)*.
13. a. Reading and translation of an unfamiliar text with dictionary.
    b. Discussion on the theme *Our Family*.
14. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
    b. Discussion on the theme *My Biography*.

15. a. Reading and translation of an unfamiliar text with dictionary.
    b. Discussion on the theme *My Friend*.
16. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
    b. Discussion on the theme *My Favorite Author*.
17. a. Reading and translation of an unfamiliar text with dictionary.
    b. Discussion on the theme *The city (village), in which I live*.
18. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
    b. Discussion on the theme *In the Library*.
19. a. Reading and translation of an unfamiliar text with dictionary.
    b. Discussion on the theme *In a Department Store*.
20. a. Reading of an unfamiliar text without dictionary and answers to questions relating to text read.
    b. Discussion on the theme *Seasons of the Year*.



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